

FIG. 1

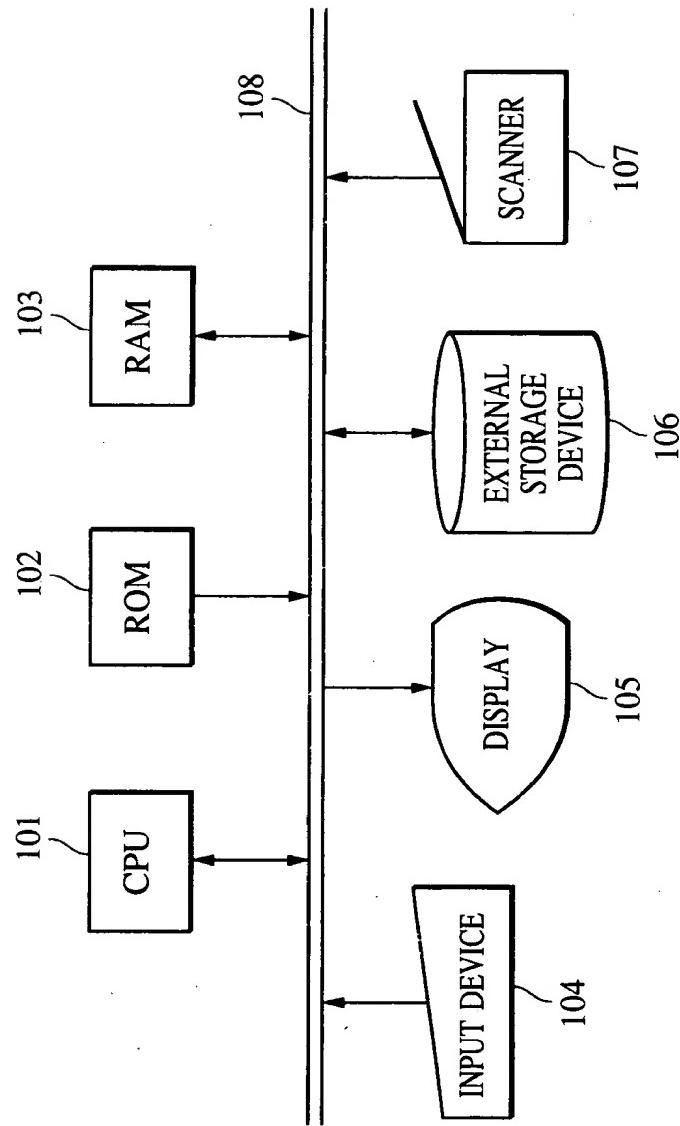


FIG. 2

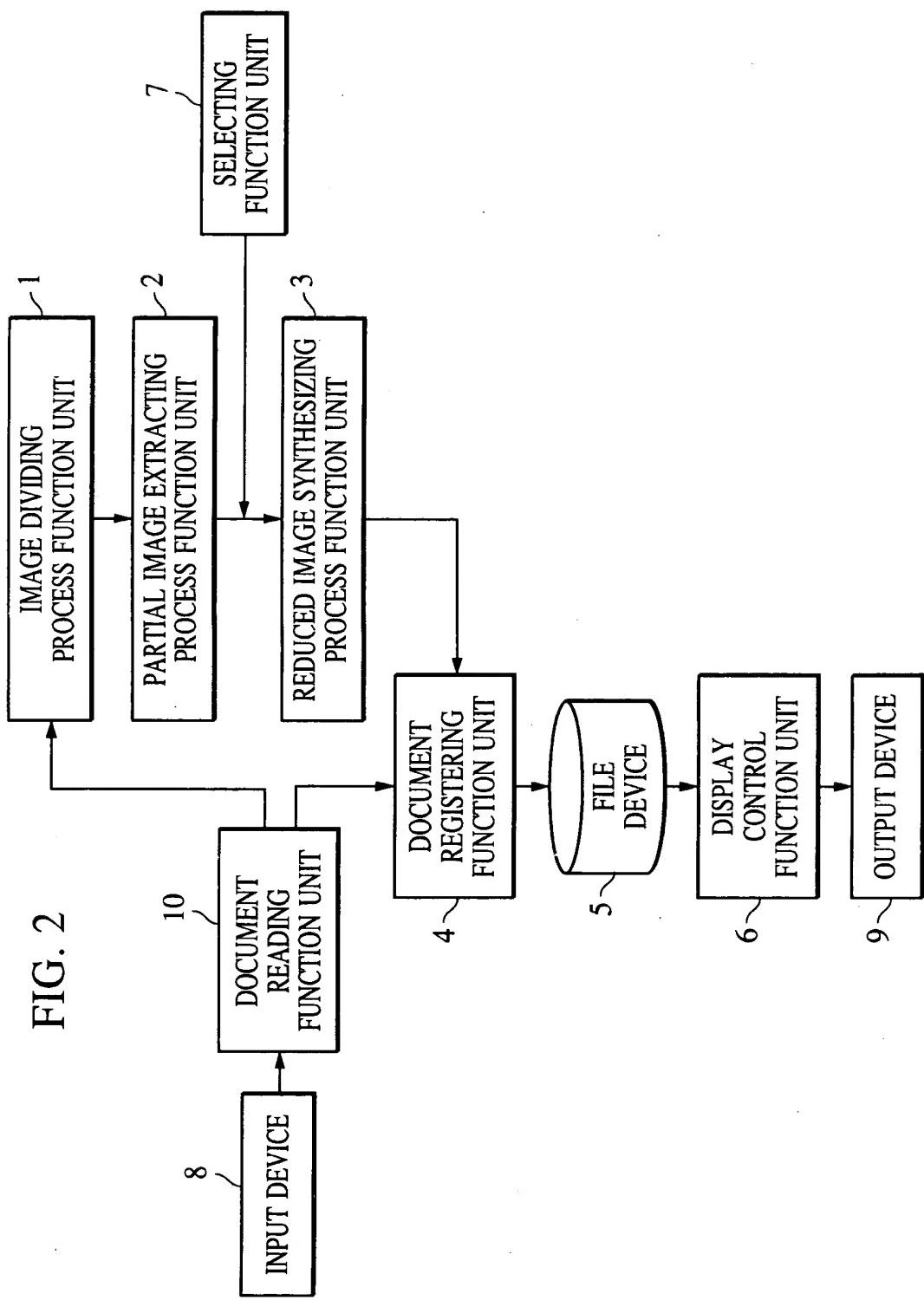


FIG. 3

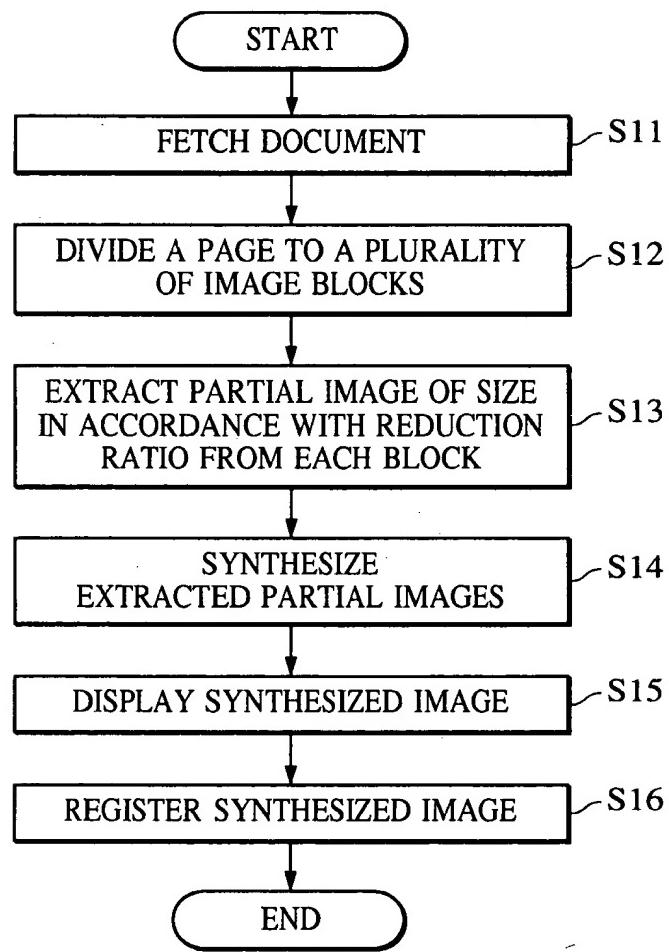


FIG. 4

21 IMAGE BLOCK A

20

23 IMAGE BLOCK C

1 INFORMATION RECORDING/REPRODUCING METHOD BACKGROUND OF THE INVENTION 1. Field of the Invention This invention relates to an information recording/reproducing method of effecting the recording and/or reproduction of information on a disk-like recording medium, and particularly to an information recording/reproducing method in which the recording area of a recording medium is divided into a plurality of zones in the radial direction of the recording medium and the recording/reproduction of information is effected with the rotational speed of the disk made to be different in each zone, whereby the spatial record length of a recording pit is made constant over the entire recording area. 2. Related Background Art Information recording/reproducing methods of recording/reproducing information on a disk-like recording medium (hereinafter referred to as the disk) include a magnetic recording/reproducing method directed to a floppy disk and an optical information recording/reproducing method directed to a CD or a magneto-optical disk. The diameter of disks used in these methods is prescribed as 5.25 or 3 inches, and the recent technical task is how densely information can be recorded on disks of such a diameter. Various information recording/reproducing methods have heretofore been devised to solve such a task and above all, attention has been paid to a method called MCAV (modified constant angular velocity) or ZCAV (zone constant angular velocity). According to this method, the recording area on the disk is divided into a plurality of zones in the radial direction of the disk, and the recording/reproducing frequency of each zone is made higher from the inner peripheral zone toward the outer peripheral zone, thereby making the recording density on the inner and outer peripheries of the recording area constant. According to this method, as compared with the conventional CAV method, there is obtained an about 50% increase in recording capacity. Another method to which attention has been paid is a method called MCLV (modified constant linear velocity) or ZCLV (zone constant linear velocity) in which the recording area on the disk is divided into a plurality of zones in the radial direction of the disk and the number of revolutions of the disk in the respective zones is made lower from the inner peripheral zone toward the outer peripheral zone, thereby making the recording density on the inner and outer peripheries of the recording area constant. Again by this method, as compared with the conventional CAV method, there is obtained an about 50% increase in capacity. In the former method, however, the linear velocity of the disk is increased toward the outer periphery of the disk and this leads to a problem that the transfer speed of reproduced data is varied by the reproducing position of the disk, and the usability of the device as an information recording/reproducing apparatus is poor. Also, a reproducing signal processing system must accommodate the transfer speed of the outermost peripheral	5,394,387 2 data, and if such a signal processing system does this, it can waste the inner peripheral portion of the disk. Also, in the latter method, the transfer speed of reproduced data is constant in the inner and outer peripheries of the disk, but when the seeking of a recording/reproducing head is performed beyond a zone, a long time is taken until the number of revolutions of a spindle motor for rotating the disk becomes equal to the number of revolutions of the corresponding zone, and this has led to a problem that the seeking time becomes long. SUMMARY OF THE INVENTION The present invention has been made in view of the above-noted problems and has as its object the provision of an information recording/reproducing method in which the recording density is made constant on the inner and outer peripheral portions of a disk to thereby increase the recording density, the transfer speed of reproduced data is constant in the inner and outer peripheral portions of the disk, and a long seeking time is not required. To achieve the above object, an information recording/reproducing method according to the present invention is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting the recording or reproduction of the information without changing the number of revolutions if the amount of information to be recorded or reproduced is equal to or smaller than a predetermined amount when seeking is effected from a zone in which a recording/reproducing head is on standby to a different zone to effect the recording or reproduction. Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting, when a zone in which the frequency of recording or reproduction exceeds a predetermined value is created in a series of recording or reproducing operations, the next recording or reproduction at a number of revolutions corresponding to that zone. Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting, when a zone in which recording or reproduction is effected and continues a predetermined or greater number of times, the next recording or reproduction at a number of revolutions corresponding to that zone. Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that
22 IMAGE BLOCK B	24 IMAGE BLOCK D

FIG. 5

INFORMATION RECORDING/REPRODUCING METHOD	1	5,394,387	2
BACKGROUND OF THE INVENTION			
1. Field of the Invention			<p>This invention relates to an information recording/reproducing method of effecting the recording and/or reproduction of information on a disk-like recording medium, and particularly to an information recording/reproducing method in which the recording area of a recording medium is divided into a plurality of zones in the radial direction of the recording medium and the recording/reproduction of information is effected with the rotational speed of the disk made to be different in each zone, whereby the spatial record length of a recording pit is made constant over the entire recording area.</p>
2. Related Background Art			<p>Information recording/reproducing methods of recording/reproducing information on a disk-like recording medium (hereinafter referred to as the disk) include a magnetic recording/reproducing method directed to a floppy disk and an optical information recording/reproducing method directed to a CD or a magneto-optical disk.</p> <p>The diameter of disks used in these methods is prescribed as 5.25 or 3 inches, and the recent technical task is how densely information can be recorded on disks of such a diameter.</p> <p>Various information recording/reproducing methods have heretofore been devised to solve such a task and above all, attention has been paid to a method called MCAV (modified constant angular velocity) or ZCAV (zone constant angular velocity). According to this method, the recording area on the disk is divided into a plurality of zones in the radial direction of the disk, and the recording/reproducing frequency of each zone is made higher from the inner peripheral zone toward the outer peripheral zone, thereby making the recording density on the inner and outer peripheries of the recording area constant. According to this method, as compared with the conventional method of effecting recording/reproduction with the number of revolutions and the recording/reproducing frequency kept constant, there is obtained an about 50% increase in recording capacity.</p> <p>Another method to which attention has been paid is a method called MCLV (modified constant linear velocity) or ZCLV (zone constant linear velocity) in which the recording area on the disk is divided into a plurality of zones in the radial direction of the disk and the number of revolutions of the disk in the respective zones is made lower from the inner peripheral zone toward the outer peripheral zone, thereby making the recording density on the inner and outer peripheries of the recording area constant. Again by this method, as compared with the conventional CAV method, there is obtained an about 50% increase in capacity.</p> <p>In the former method, however, the linear velocity of the disk is increased toward the outer periphery of the disk and this leads to a problem that the transfer speed of reproduced data is varied by the reproducing position of the disk, and the usability of the device as an information recording/reproducing apparatus is poor. Also, a reproducing signal processing system must accomodate the transfer speed of the outermost peripheral</p>
501			<p>data, and if such a signal processing system does this, it can waste the inner peripheral portion of the disk.</p> <p>Also, in the latter method, the transfer speed of reproduced data is constant in the inner and outer peripheries of the disk, but when the seeking of a recording/reproducing head is performed beyond a zone, a long time is taken until the number of revolutions of a spindle motor for rotating the disk becomes equal to the number of revolutions of the corresponding zone, and this has led to a problem that the seeking time becomes long.</p>
502			<p>SUMMARY OF THE INVENTION</p> <p>The present invention has been made in view of the above noted problems and has as its object the provision of an information recording/reproducing method in which the recording density is made constant on the inner and outer peripheral portions of a disk to thereby increase the recording density, the transfer speed of reproduced data is constant in the inner and outer peripheral portions of the disk, and a long seeking time is not required.</p> <p>To achieve the above object, an information recording/reproducing method according to the present invention is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting the recording or reproduction of the information without changing the number of revolutions if the amount of information to be recorded or reproduced is equal to or smaller than a predetermined amount when seeking is effected from a zone in which a recording/reproducing head is positioned to a different zone to effect the recording or reproduction.</p> <p>An information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting, when a zone in which the frequency of recording or reproduction exceeds a predetermined value is created in a series of recording or reproducing operations, the next recording or reproduction at a number of revolutions corresponding to that zone.</p> <p>Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting, when a zone in which recording or reproduction is effected and continues a predetermined or greater number of times, the next recording or reproduction at a number of revolutions corresponding to that zone.</p> <p>Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that</p>
503			504

FIG. 6

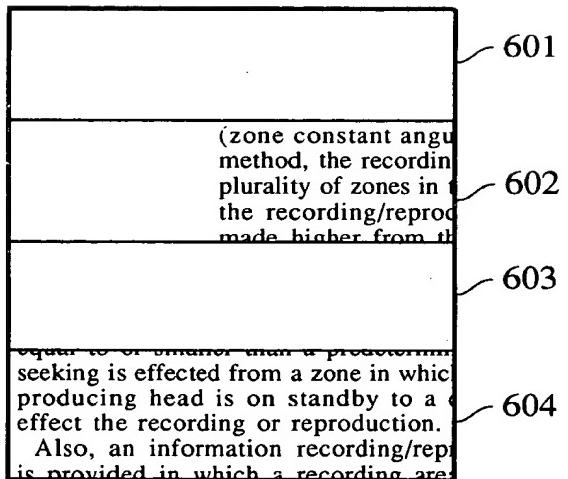


FIG. 7

701

- REDUCED IMAGE LIST



702

703

(zone constant angular method, the recording plurality of zones in the recording/reproducing mode higher from the outer to the inner zone)

density on the inner recording area constant. A with the convention an about 50% increase

In the former method

recording or reproduction of seeking is effected from a zone in which producing head is on standby to effect the recording or reproduction. Also, an information recording/reproducing area is provided in which a recording area is provided in which a recording area

recording or reproduction of seeking is effected from a zone in which producing head is on standby to effect the recording or reproduction. Also, an information recording/reproducing area is provided in which a recording area

704

FIG. 8

801		803	
INFORMATION RECORDING/REPRODUCING METHOD	1 5,394, 1587	2 5,394, 1587	
<p>BACKGROUND OF THE INVENTION</p> <p>1. Field of the Invention</p> <p>This invention relates to an information recording/reproducing method of effecting the recording and/or reproduction of information on a disk-like recording medium, and particularly to an information recording/reproducing method in which the recording area of a recording medium is divided into a plurality of zones in the radial direction of the recording medium and the recording/reproduction of information is effected with the rotational speed of the disk made to be different in each zone, whereby the spatial record length of a recording pit is made constant over the entire recording area.</p> <p>2. Related Background Art</p> <p>Information recording/reproducing methods of recording/reproducing information on a disk-like recording medium (hereinafter referred to as the disk) include a magnetic recording/reproducing method directed to a floppy disk and an optical information recording/reproducing method directed to a CD or a magneto-optical disk.</p> <p>The diameter of disks used in these methods is prescribed as 5.25 or 3 inches, and the recent technical task is how densely information can be recorded on disks of such a diameter.</p> <p>Various information recording/reproducing methods have heretofore been devised to solve such a task and above all, attention has been paid to a method called MCAV (modified constant angular velocity) or ZCAV (zone constant angular velocity). According to this method, the recording area on the disk is divided into a plurality of zones in the radial direction of the disk, and the recording/reproducing frequency of each zone is made higher from the inner peripheral zone toward the outer peripheral zone, thereby making the recording density on the inner and outer peripheries of the recording area constant. According to this method, as compared with the conventional method of effecting recording/reproduction with the number of revolutions and the recording/reproducing frequency kept constant, there is obtained an about 50% increase in recording capacity.</p> <p>Another method to which attention has been paid is a method called MCLV (modified constant linear velocity) or ZCLV (zone constant linear velocity) in which the recording area on the disk is divided into a plurality of zones in the radial direction of the disk and the number of revolutions of the disk in the respective zones is made lower from the inner peripheral zone toward the outer peripheral zone, thereby making the recording density on the inner and outer peripheries of the recording area constant. Again by this method, as compared with the conventional CAV method, there is obtained an about 50% increase in capacity.</p> <p>In the former method, however, the linear velocity of the disk is increased toward the outer periphery of the disk and this leads to a problem that the transfer speed of reproduced data is varied by the reproducing position of the disk, and the usability of the device as an information recording/reproducing apparatus is poor. Also, a reproducing signal processing system must accomodate the transfer speed of the outermost peripheral</p>	<p>data and in such a signal processing system dose this, it will waste the inner peripheral portion of the disk. Also, in the latter method, the transfer speed of reproduced data is constant in the inner and outer peripheries of the disk, but when the seeking of a recording/reproducing head is performed beyond a zone, a long time is taken until the number of revolutions of a spindle motor for rotating the disk becomes equal to the number of revolutions of the corresponding zone, and this has led to a problem that the seeking time becomes long.</p> <p>SUMMARY OF THE INVENTION</p> <p>The present invention has been made in view of the above noted problems and has as its object the provision of an information recording/reproducing method in which the recording density is made constant on the inner and outer peripheral portions of a disk to thereby increase the recording density, the transfer speed of reproduced data is constant in the inner and outer peripheral portions of the disk, and a long seeking time is not required.</p> <p>To achieve the above object, an information recording/reproducing method according to the present invention is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting the recording or reproduction of the information without changing the number of revolutions if the amount of information to be recorded or reproduced is equal to or smaller than a predetermined amount when seeking is effected from a zone in which a recording/reproducing head is positioned to a different zone to effect the recording or reproduction.</p> <p>Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting, when a zone in which the frequency of recording or reproduction exceeds a predetermined value is created in a series of recording or reproducing operations, the next recording or reproduction at a number of revolutions corresponding to that zone.</p> <p>Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting, when a zone in which recording or reproduction is effected and continues a predetermined or greater number of times, the next recording or reproduction at a number of revolutions corresponding to that zone.</p> <p>Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that</p>	804	
802			

FIG. 9

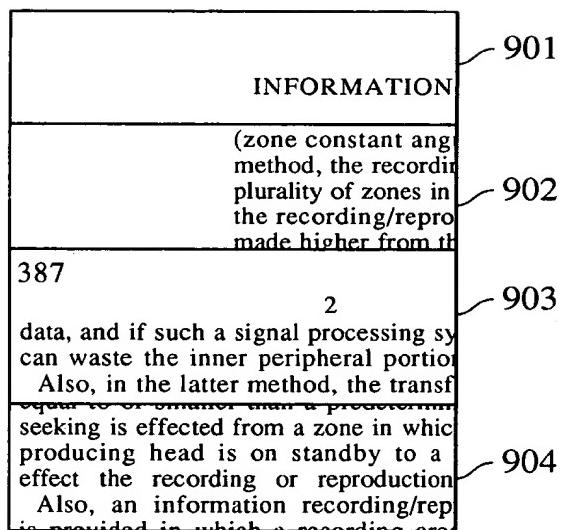


FIG. 10

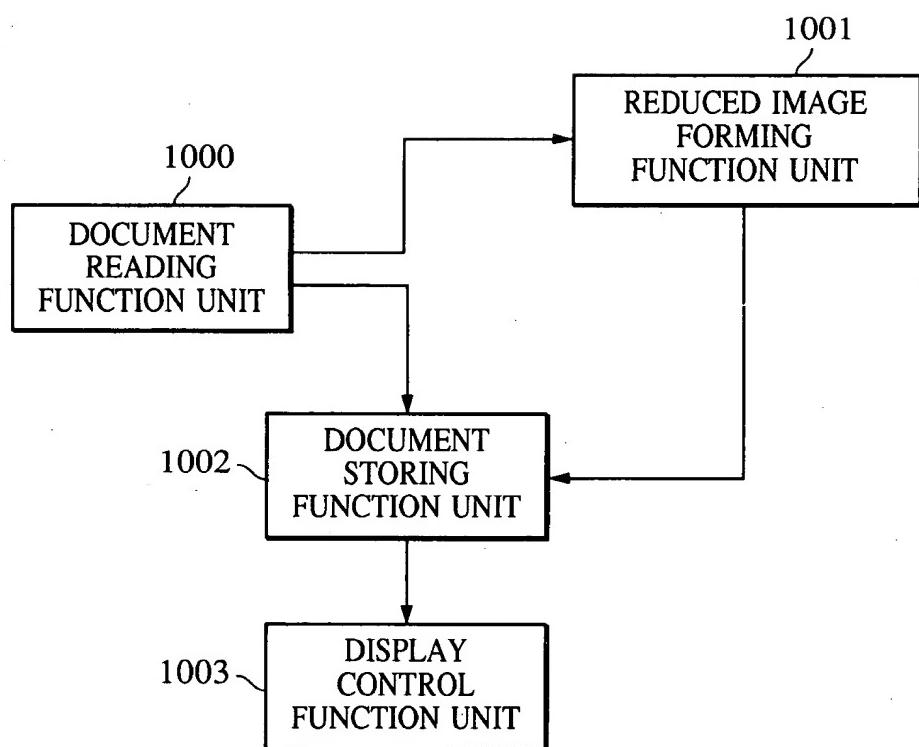


FIG. 11

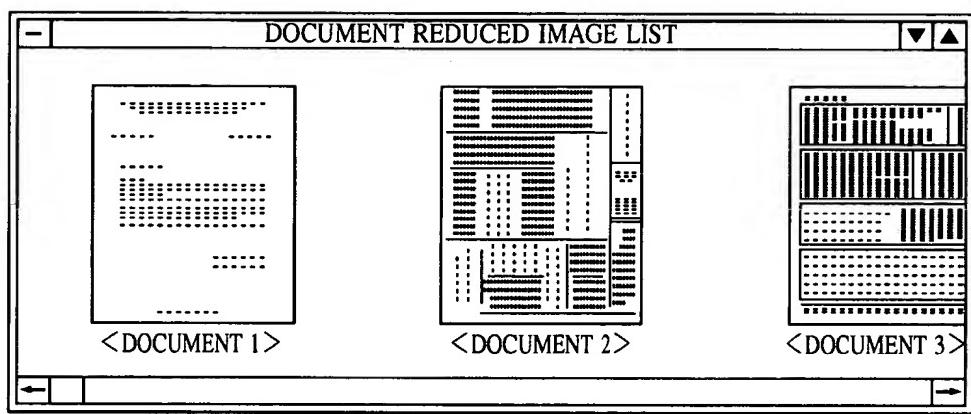
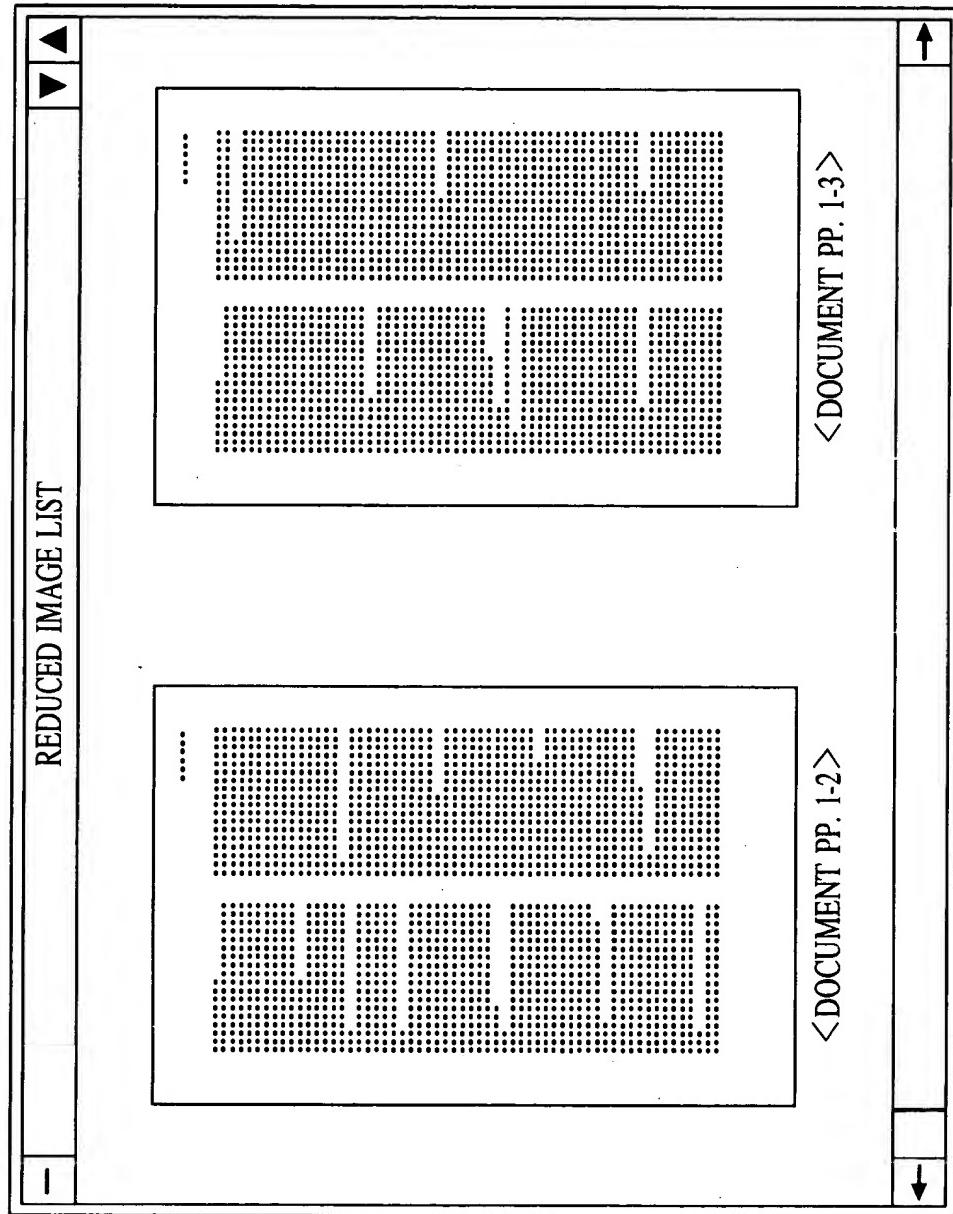


FIG. 12



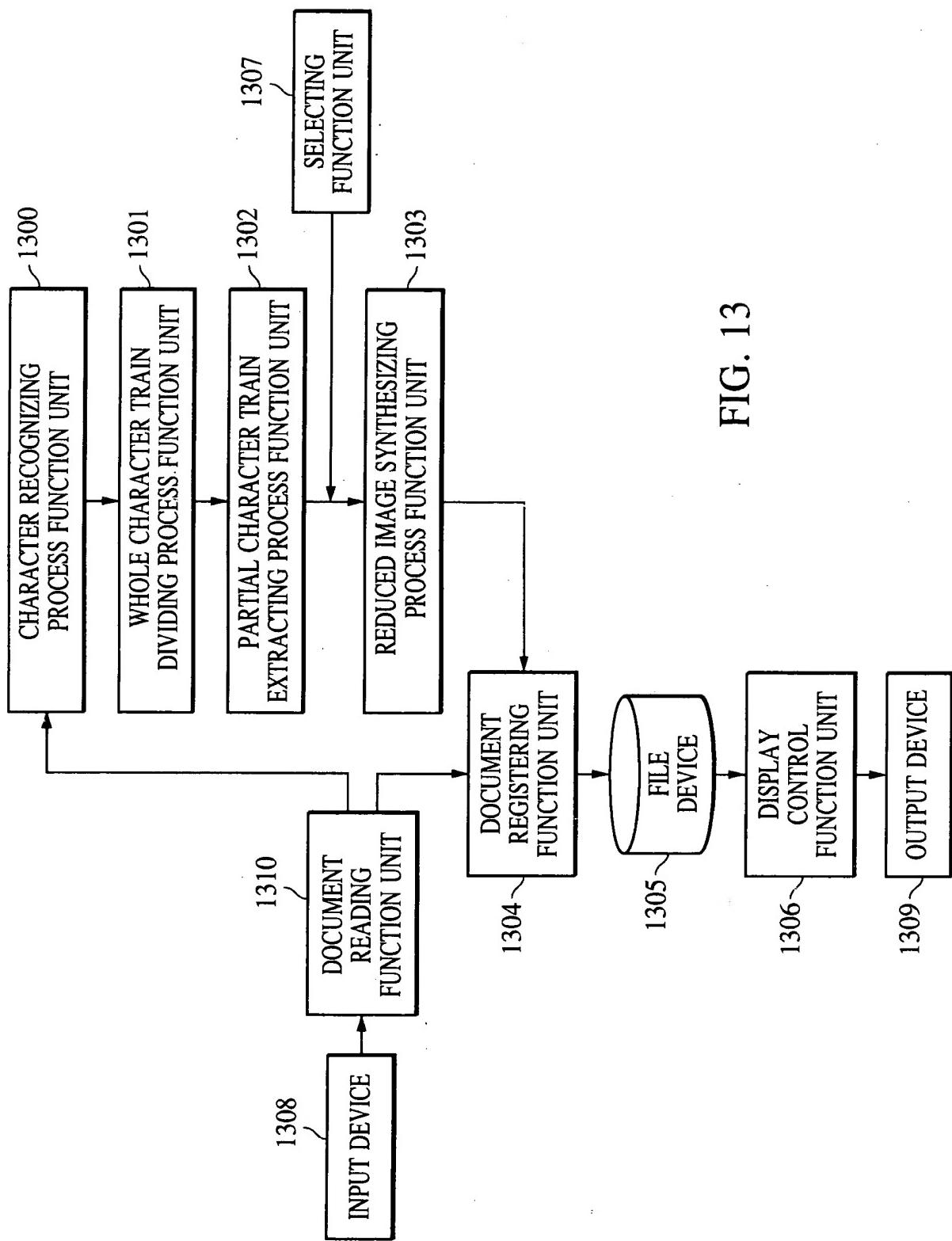


FIG. 13

FIG. 14

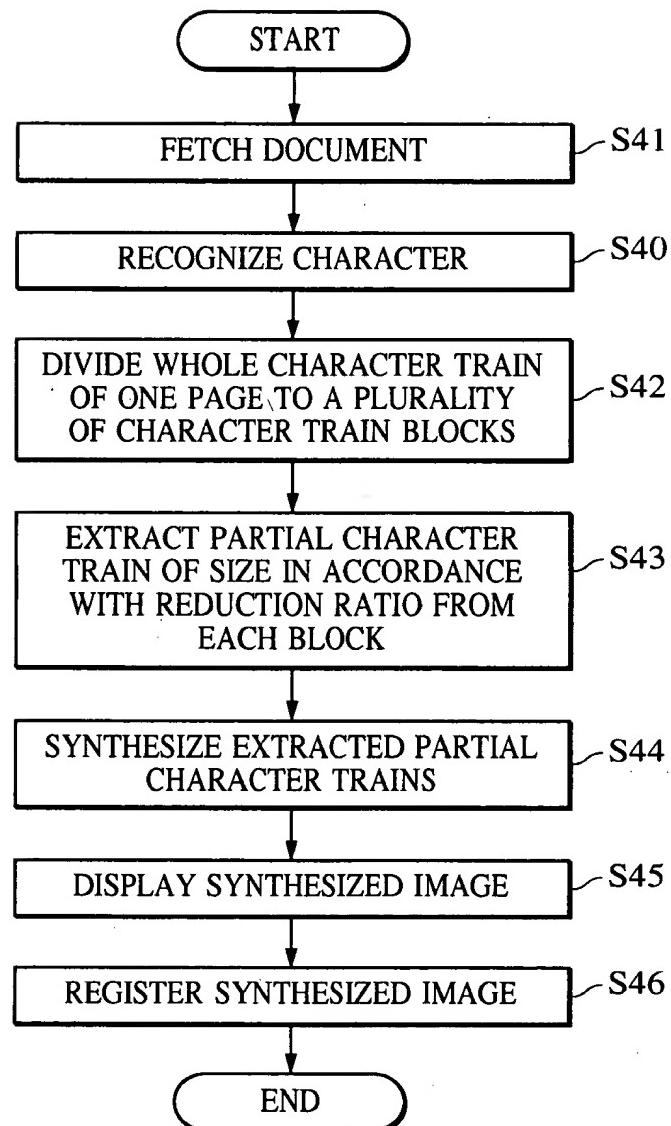


FIG. 15

420

121e
CHARACTER
TRAIN
BLOCK A

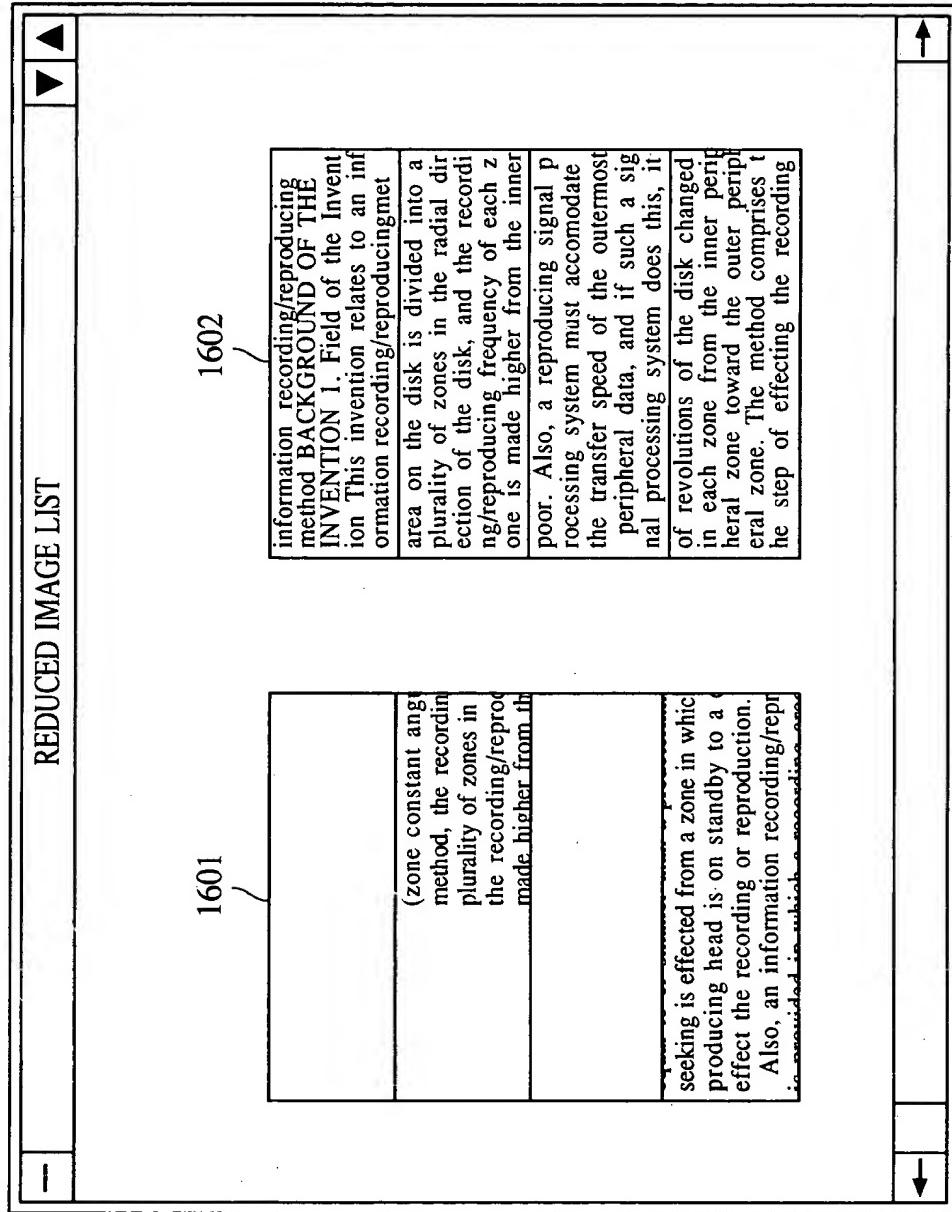
122e
CHARACTER
TRAIN
BLOCK B

124e
CHARACTER
TRAIN
BLOCK D

123e
CHARACTER TRAIN BLOCK C

information recording/reproducing method **BACKGROUND OF THE INVENTION** 1 Field of the Invention This invention relates to an information recording/reproducing method of effecting the recording and/or reproduction of information on a disk-like recording medium, and particularly to an information recording/reproducing method in which the recording area of a recording medium is divided into a plurality of zones in the radial direction of the recording medium and the recording/reproduction of information is effected with the rotational speed of the disk made to be different in each zone, whereby the spatial record length of a recording pit is made constant over the entire recording area. 2 Related Background Art Information recording/reproducing methods of recording/reproducing information on a disk-like recording medium (hereinafter referred to as the disk) include a magnetic recording/reproducing method directed to a floppy disk and an optical information recording/reproducing method directed to a CD or a magneto-optical disk. The diameter of disks used in these methods is prescribed as 5.25 or 3 inches, and the recent technical task is how densely information can be recorded on disks of such a diameter. Various information recording/reproducing methods have heretofore been devised to solve such a task and above all, attention has been paid to a method called MCAV (modified constant angular velocity) or ZCAV (zone constant angular velocity). According to this method, the recording area on the disk is divided into a plurality of zones in the radial direction of the disk, and the recording/reproducing frequency of each zone is made higher from the inner peripheral zone toward the outer peripheral zone, thereby making the recording density on the inner and outer peripheries of the recording area constant. According to this method, as compared with the conventional method of effecting recording/reproduction with the number of revolutions and the recording/reproducing frequency kept constant, there is obtained an about 50% increase in recording capacity. Another method to which attention has been paid is a method called MCLV (modified constant linear velocity) or ZCLV (zone constant linear velocity) in which the recording area on the disk is divided into a plurality of zones in the radial direction of the disk and the number of revolutions of the disk in the respective zones is made lower from the inner peripheral zone toward the outer peripheral zone, thereby making the recording density on the inner and outer peripheries of the recording area constant. Again by this method, as compared with the conventional CAV method, there is obtained an about 50% increase in capacity. In the former method, however, the linear velocity of the disk is increased toward the outer periphery of the disk and this leads to a problem that the transfer speed of reproduced data is varied by the reproducing position of the disk, and the usability of the device as an information recording/reproducing apparatus is poor. Also, a reproducing signal processing system must accommodate the transfer speed of the data from the inner peripheral portion of the disk to the outer peripheral portion of the disk. Also, in the latter method, the transfer speed of reproduced data is constant in the inner and outer peripheries of the disk, but when the seeking of a recording/reproducing head is performed beyond a zone, a long time is taken until the number of revolutions of a spindle motor for rotating the disk becomes equal to the number of revolutions of the corresponding zone, and this has led to a problem that the seeking time becomes long. **SUMMARY OF THE INVENTION** The present invention has been made in view of the above-noted problems and has as its object the provision of an information recording/reproducing method in which the recording density is made constant on the inner and outer peripheral portions of a disk to thereby increase the recording density, the transfer speed of reproduced data is constant in the inner and outer peripheral portions of the disk, and a long seeking time is not required. To achieve the above object, an information recording/reproducing method according to the present invention is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting the recording or reproduction of the information without changing the number of revolutions if the amount of information to be recorded or reproduced is equal to or smaller than a predetermined amount when seeking is effected from a zone in which a recording/reproducing head is in standby to a different zone to effect the recording or reproduction. Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that the lengths of recording pits may become the same in the entire recording area of the disk and the recording/reproduction of information is effected with the number of revolutions of the disk changed in each zone from the inner peripheral zone toward the outer peripheral zone. The method comprises the step of effecting, when a zone in which the frequency of recording or reproduction exceeds a predetermined value is created in a series of recording or reproducing operations, the next recording or reproduction at a number of revolutions corresponding to that zone. Also, an information recording/reproducing method is provided in which a recording area is divided into a plurality of zones in the radial direction of a disk so that

FIG. 16



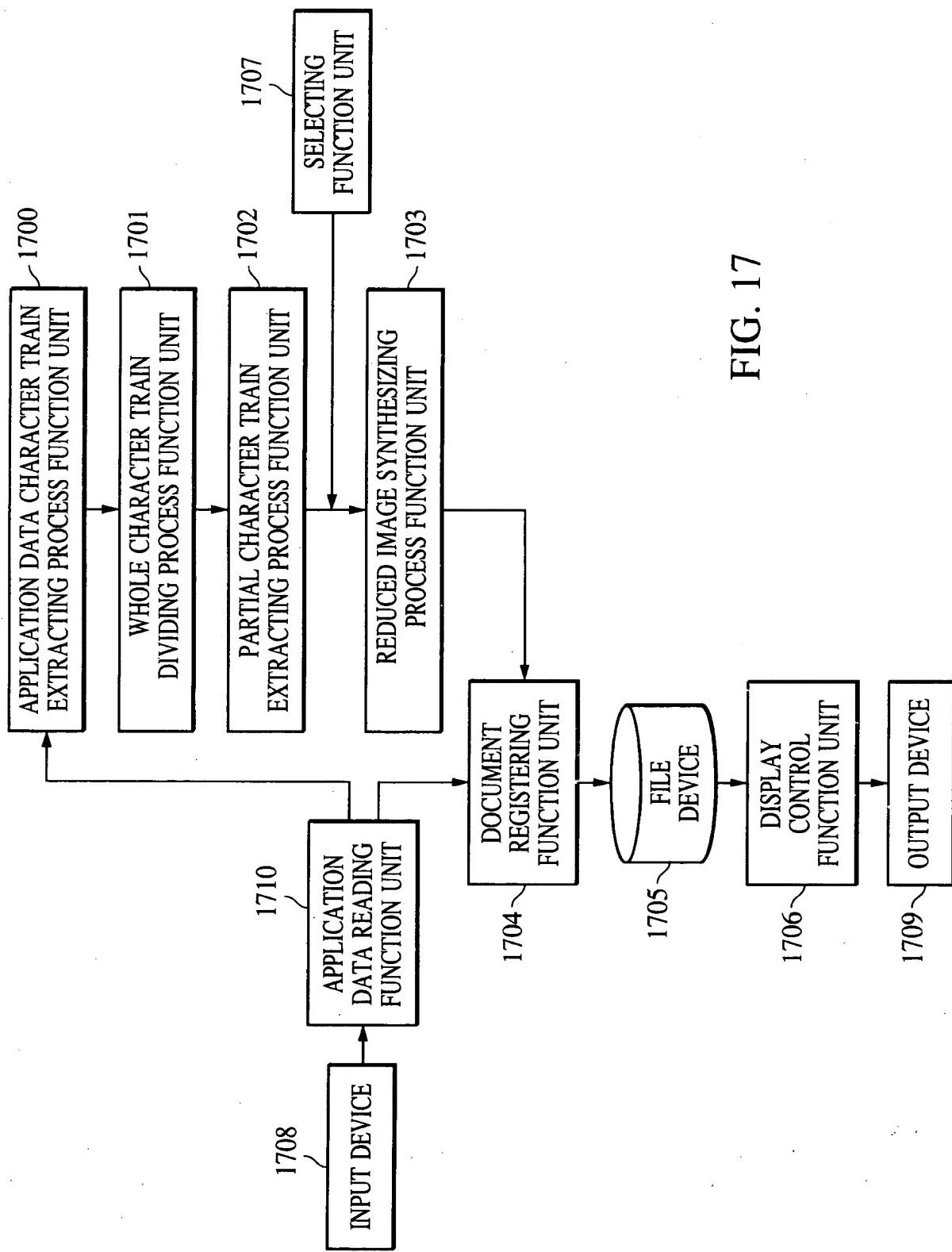


FIG. 17

FIG. 18

